DOCUMENT RESUME

ED 342 381 IR 015 415

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TITLE What Do We Really Know about Small Group CBT?
PUB DATE 91
NOTE 33p.; Paper presented at the Annual Conference of the Association for the Development of Computer-based Instructional Systems (33rd, St. Louis, MO, November 11-14, 1991).
PUB TYPE Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Academic Achievement; Comparative Analysis; *Computer Assisted Instruction; Cooperative Learning; Cost Effectiveness; Educational Strategies; Elementary Secondary Education; *Group Dynamics; *Instructional Effectiveness; Interpersonal Relationship; Meta Analysis; Microcomputers; *Small Group Instruction; Student Attitudes; Surveys; Teacher Attitudes

ABSTRACT

Foremost among many recent trends in education has been a surge of interest in small group instruction. Questions remain concerning the relative educational value of small group computer assisted instruction (CAI) or CBT (broadly defined as instructional use of computers). This paper presents the results of an investigation of 55 works on this topic. The works include previous review articles, comparisons of small group versus individualized CBT, investigations of the relative impact of different grouping strategies, and observational and questionnaire surveys of small group CBT use. The 55 works are presented in the following groups: 10 review articles, 20 comparison studies, 16 grouping studies, and 15 survey studies. Some overlap between comparison and grouping studies does occur. Consistent effects were not found for either small group or individualized use of computers on students' academic achievement or retention scores. Small group learning did lead to a more efficient use of the computers. In addition, positive social interactions among students were typically found for small group CBT activities. Small group CBT can thus seemingly help educators and trainers meet the contemporary challenge of using computers with dwindling financial resources. (57 references) (DB)

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ED342381

What Do We Really Know About Small Group CBT?

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running head: Small Group CBT

Paper presented at the 1991 annual meeting of the Association for the Development of Computer Instructional Systems, St Louis, MO. Opinions in this paper of those of the author and do not necesarily reflect those of the U.S. Army Research Institute, the U.S. Army or the U.S. Government.

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Abstract

Foremost among many recent trends in education has been a surge of interest in small group learning. Questions though remain about the relative educational value of small group CBT. This investigation examined 55 works on this topic. These works included previous review articles, comparisons of small group versus individualized CBT, investigations of the relative impact of different grouping strategies, and observational and/or questionnaire surveys of small group CBT use. Consistent effects were not found for either small group or individualized use of computers on students' achievement or retention scores. Small group learning did lead to a more efficient use of the computers. And, positive social interactions among students were typically found for small group CBT activities. Small group CBT can thus seemingly help educators and trainers meet the contemporary challenge of using computers with dwindling financial resources.

What Do We Really Know About Small Group CBT?

Foremost among many recent trends in education has been a surge of interest in cooperative learning. A computer search of the ERIC system produced 628 professional works during the last seven years on this topic as compared to 105 such works from 1965 to 1982. Underlying this trend is the belief that cooperative learning can help improve educational systems throughout the world. Smith (1987) has noted that cooperative learning is the single most important educational change in his 22 years of teaching. It has revitalized the educational processes by giving teachers and students a more positive attitude toward education (Smith). Small group use of computer technology has been characterized as the ideal solution to the scheduling and economic problems inherent in individualized use of computer technology for educational purposes (Webb, Ender & Lewis, 1986; Vlacke, 1988). And, small group CBT may be an effective method for addressing student differences (Watson, 1991). These claims for small group CBT(broadly defined as instructional use of computers), however, have been based primarily on cooperative learning tasks that did not involve the use of a computer. Hence, this widely held view of the educational value of small group CBT may not be valid. In other words,

> What do we really know about the educational value of small group CBT?

Overview of the Literature Search

To answer this question, a systematic search of the cooperative/small group CBT literature was conducted.

Bibliographical indexes in the fields of education (Educational Resources Informational Clearinghouses-ERIC), corporate training, and defense training (Defense Training Informational Clearinghouse; DTIC) were combed for citations dealing with small group training or cooperative learning and instructional uses of computer technology. Other citations were found by searching through proceedings of professional conferences, browsing recent periodicals on education and CBT, and scrutinizing the reference sections of other relevant reviews. Finally, researchers on cooperative learning and/or CBT were contacted via phone, mail, E-mail, and computer bulletin boards for information regarding their latest work on this topic.

Over eighty citations were found dealing with small group/cooperative learning and instructional uses of computer technology. However, several citations dealing solely with methods for implementing small group CBT were eliminated from this examination (e.g., Anderson, 1988). Works not available to this author (e.g., dissertations) were also eliminated from this review.

Fifty-five works were then included in this survey. These works were grouped by the following scheme:

1. Review Articles. Reviews of previous studies concerning small group CBT.
2. Comparison Studies. Investigations comparing the effects of small group CBT versus individualized CBT upon students' achievement scores, retention performance, and attitudes.

3. Grouping Studies. Investigations of the relative impact of different grouping strategies (e.g., heterogeneous ability grouping versus homogeneous ability grouping) on students' achievement, retention, and attitude scores.
4. Survey Studies. Observational and/or questionnaire surveys of small group use of computers.

The breakdown by categories was:

10--Review Studies

20--Comparison Studies

16--Grouping Studies

15--Survey Studies

This total is more than 55, as several works were both comparison and grouping studies (e.g., Dosset & Hulvershorn, 1983; Hooper, 1991; Underwood, McCaffrey & Underwood, 1990).

Summary of the Review Articles

As mentioned, there have been ten previous articles or papers that have discussed research dealing with computers and small group training. (Clements, 1987; Dickson & Vereen, 1983; Johnson & Johnson, 1988; Fox, 1988; Moersch, 1987; Nastasi & Clements, 1991; Rysavy & Sales, 1989; Simpson, 1986; Vlacke, 1988; Watson, 1991). These reviews have trumpeted the use of small group CBT. Johnson and Johnson have described the use of cooperative CBT as an ideal partnership that maximizes the instructional advantages of each partner. And, Rysavy & Sales have concluded that there are many positive results from small group learning at the computer. As they

stated:

> Group work allows students to observe, imitate and learn from each other. Students keep each other on task and share a sense of accomplishment (p 78).

However, these previous reviews based their conclusions regarding small group CBT on a limited number of investigations on this topic. Rysavy and Sales, for instance, only reviewed journal articles on small group use of computers between 1981 and 1989, which are a small sampling of the relevant research. Also, the conclusions made by Rysavy and Sales and others (e.g., Clements, 1987; Valcke, 1988) were partially based upon studies that observed students' behaviors for small group use of computers without comparative data for individualized CBT. And, conclusions from other reviews (e.g., Johnson & Johnson, 1988; Moersch, 1987; Simpson, 1986) were primarily based upon research dealing with small group or cooperative learning for situations that did not involve computers. Such research might not transfer to CBT situations as this instructional medium has been primarily designed for individualized learning or problem-solving. The question thus remains, what do we really know about the educational value of cooperative/small group use of computer technology?

Summary of the Comparison Studies

Description of studies.

These studies are capsulized in Table 1 by subject populations, tasks, duration of computer task, type of grouping(small group, triads, dyads, or individuals), and main

findings. As shown in this table, the subjects sampled varied from elementary school students to adult trainees with most of these studies concerning older elementary school students. A wide assortment of tasks was also sampled, from learning military procedures to understanding boolean algebra. The durations of these tasks ranged from one ten-minute session (Carrier & Sayles, 1987) to several weeks or months (e.g., Mevarech, Silber, & Fine, 1991) with the majority of studies involving multiple training sessions.

All these studies did assess students' learning of the instructional materials. Three studies also measured students' retention of these materials (Carrier & Sayles; Mevarech et al., 1991; Shlechter, 1991). And, students' attitudes toward small group CBT were also examined by several researchers(e. g., Dalton, 1989; Shlecher, Rude-Parkins, & Pollock, in preparation). Except for a few studies (e.g., Mevarech, Stern & Levita, 1987; Mevarech et al., 1991), non-standardized tests were used to assess these performance measures.

Findings

The most salient finding was the relative instructional efficiency of small group CBT as compared to individualized CBT. Nine studies found evidence for this effect (Dosset & Hulvershorn, 1983; Fletcher, 1986; Guntermann & Tovar, 1987; Hooper, 1991; Kacer, Rocklin, & Weinholtz, 1991; Okey & Majer, 1976; Johnson, Johnson, & Stanne, 1986; Shlechter, 1990; Trowbridge & Durnin, 1984). Okey & Majer found, for example, that small group CBT (four at a terminal) was nearly five times as instructionally efficient

as individualized CBT. Small group CBT also resulted in students' having fewer problems with the courseware and needing less instructor assistance to complete the assignment (e.g., Hooper; Johnson et al.; Kacer et al). Kacer et al., for example, found that the individual training subjects asked procedural questions about the computer program while the paired training subjects were able to ask conceptual questions regarding the subject matter.

No consistent effects were found for either small group or individual CBT on students' achievement and retention scores. A few studies did show some significant effects for small group CBT on students' achievement scores (e.g., Dalton et al., 1989; Hooper, 1991; Meverech et al., 1987; 1991). However, these effects were usually not very substantial. Hooper, for example, only found an effect of less than a 1/3 of a standard deviation for small group CBT. Two studies did find significant effects for small group CBT on students' retention scores (Meverech et al., 1991; Shlechter, 1990). However, Shlechter's findings were marginally signficant ($p=.05$). And, Meverech's data show differences of only a few points between students in the paired and individual training conditions after initial scores had been taken into account.

Finally, limited evidence exists regarding possible aptitude-by-treatment interactions (ATI) between small group training and student characteristics. Sutter and Reid (1969) found that small group training was most suitable for students with high levels of sociability--as measured by the California Personality Inventory---while individualized CBT was best for the more introverted

subjects. Shlechter et al. (in preparation) also found that lower and higher ability students' preferences for small group or individualized CBT were task dependent. Higher ability students favored small group CBT for tasks accompanied by individualized testing while lower ability students favored small group CBT for tasks involving group performance.

These comparison studies left virtually unexplored many important issues on this topic. Little or no information was provided on the:

(1) relative value of small group learning for computer and non-computer tasks.

(2) ATI in students' preference for and ability to use small group and individualized CBT.

(3) relative effects of small group CBT on students' social behaviors.

and (4) instructional arrangements most advantageous for small group CBT.

Perhaps insights into these issues could be obtained vis-a-vis the grouping and survey studies.

Table 1. Characteristics and Outcomes for the Comparison Studies

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Key:

s= types of subjects; g= types of groups; t= task; d=durations of computer tasks; g=types of groups;f=main findings.

Grp=5-4 in group; TD=Triads; PD=Pairs; IND=Individuals

Slightly=non-significant or marginally significant difference (p = or > .05)

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1. Bellows (1987)
   - s. Second graders
   - g. TD, PD, and IND
   - t. social studies map reading task
   - d. one session
   - f. no effects for TD or PD

2. Carrier and Sales (1987)
   - s. college students
   - g. PD and IND
   - t. learning different types of concepts
   - d. one ten minute session
   - f. no differences in achievement and retention scores
     PD spent more time on practice and feedback screens

3. Dalton et al. (1989)
   - s. eighth graders
   - g. PD and IND
   - t. learning aspects of human biology
   - d. one thirty minute session
   - f. PD scored 20% higher than IND on a 48 item achievement test

4. Dosset and Hulvershorn (1983)
   - s. Air Force students
   - g. PD, IND, and conventional training
   - t. learning electronic principles
   - d. a six week course
   - f. no differences in achievement scores
     PD less time in training

5. Fletcher (1985)

s. 10-11 year old children from Great Britain
g. PD and IND
t. problem solving task
d. one session
f. PD solved problems more efficiently

6. Guntermann and Tovar(1987)
s. fourth graders
g. TRD, PD, and IND
t. problem-solving with logo
d. three sessions
f. no difference on achievement scores
PD took fewer commands to complete the task
TD slightly less time to complete task

7. Hooper (1991)
s. fifth and sixth graders
g. PD and IND
t. learning a rule based arithmetic system
d. one session
f. PD achievement score higher by .3 s.d.
PD needed fewer attempts to complete the quizzes

8. Johnson et al.(1986)
s. eighth graders
g. cooperative GRP, competitive GRP, and IND
t. geography gaming task
d. ten class periods
f. Coop GRP had slightly higher final test scores
Coop GRP needed less help from teachers
Coop GRP did best on computer lessons

9. Kacer et al. (1991)
s. college students
g. PD and IND
t. learning computer applications on AppleWorks
d. three weeks
f. no differences on test scores and attitudinal measures
PD asked conceptual while IND asked procedural questions to teacher

10. Karweit and Livingston (1969)
s. sixth graders
g. TD, PD, and IND
t. mathematical gaming task
d a month
f. IND slightly higher on test performance
TD and PD slightly higher on game performance

11. Love (1969)

s. high school students
g. PD and IND
t. boolean algebraic task
d. five class-periods
f. no difference in test scores or time to complete task
PD more confidence in performance

12. Mevarech et al. (1991)
s. sixth graders from Israel
g. PD and IND
t. drill-and-practice in mathematics
d one semester
f. PD had slightly higher achievement and retention scores
slight effect for low ability PD on math anxiety
no difference for math self-concept

13. Mevarech et al. (1987)
s. junior high students from Israel
g. PD and IND
c. learning a language
d. two months
f. PD had slightly higher achievement scores
PD scored higher on test of sociability

14. Okey and Majer (1976)
s. college students
g. TRD, PD, and IND
t. learning teaching concepts
d two class-periods
f. no differences in test scores
TRD led to the most efficient use of CBT

15. Shlechter (1990)
s. armor soldiers
g. GRP, PD, and IND
t. learning military communications
d. one four-five hour session
f. no differences in immediate achievement scores
GRP and PD had slightly better retention
GRP led to most efficient use of computers

16. Shlechter (1988)
s. armor soldiers
g. GPR PD, and IND
t. learning military communications
d. one four-five hour session
f. PD slightly more effective for lower ability students

17. Shlechter et al. (in preparation)
    s. seventh graders
    g. GRP, PD, and IND
    t. learning about spiders and computer applications
    d. one or three class-periods
    f. no differences in achievement scores
       complex interaction between attitude and grouping

18. Sutter and Reid (1969)
    s. college students
    g. PD and IND
    t. strategies in problem solving
    d. a mini-course of two weeks on problem-solving
    f. no differences in achievement scores between treatments
       individual differences for effectiveness of treatments

19. Trowbridge and Durnin (1984)
    s. seventh and eighth graders
    g. GRP, TD, PD, and IND
    t. learning concepts of electricity
    d. one session
    f. no difference on achievement scores
       PDs made fewer incorrect entries
       TDs were the most competitive

20. Underwood et al.(1990)
    s. fifth graders
    g. PD and IND
    t. language task
    d. one session
    f PD more efficient for same-sex pairings

Summary of Grouping Studies

Description of these studies

These studies are annotated in Table 2 by subject populations, conditions, durations, tasks, and main findings. These studies mainly sampled elementary school students or college undergraduates and tended to use conceptual-knowledge or problem-solving tasks. Again, the durations of these studies varied from one session to several with the majority of them lasting only one session. The following types of groupings were primarily examined: (a)

heterogeneous versus homogeneous mixing by gender; (b) heterogeneous versus homogeneous mixing by abilities; and (c) cooperative groups (i.e., one score for the group) versus competitive groups (scores for each individual in the group).

Findings

Two salient patterns emerged from these data. One, heterogeneous abilities helped the performance of lower ability students without any negative effects on the higher ability students. This finding was reported across tasks and subject populations (e.g,. Bellows, 1987; Dossett & Hulvershorn, 1983; Hooper & Hanifan, 1988). Seemingly then, higher ability students took the time to explain the materials to their lower ability counterparts. It must be noted that Hooper (1991), who sampled students of high and moderate abilities, found cooperative learning to be more prevalent for the homogeneous groups. Perhaps then, heterogeneous abilities grouping is only best for students with extreme differences in their abilities.

A second trend was that task demands could help foster cooperative behaviors and performance (e.g. Clements & Nastasi, in press; Clements & Nastasi, 1988; Johnson et al., 1986; King, 1990; 1991; Strommen, 1991). Studies by Clements and Nastasi showed that helping activities were more prevalent at computer terminals during a LOGO task than during a non-LOGO task. Also, Strommen found that having partners play against the computer promoted sharing and helping behaviors while having dyads play against each other fostered competitive behaviors.

Some insights were thus provided by these studies into the instructional arrangements most advantageous for small group CBT. Perhaps then, the survey studies could provide insights into these remaining issues:

(1) relative value of small group learning for computer and non-computer tasks.

(2) ATI in students' preferences for and abilities to use small group and individualized CBT.

(3) relative effects of small group CBT on students' social behaviors.

Table 2: Grouping Studies

Key:

s= types of subjects; c= conditions; t=task d=duration; f=main findings.

Grp=5-4 in group; TD=Triads; PD=Pairs; IND=Individuals

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1. Bellows (1987)
   - s. second graders
   - c. TD and PD of mixed and same (high and low)abilities
   - t. social studies map reading task
   - d. one session
   - f. mixed abilities with highest achievement scores
     high ability students did dominate

2. Clements and Natasi (1988)
   - s. first and third graders
   - c. Logo PD versus regular CAI PD
   - t. Logo problem solving
   - d. several weeks
   - f. metacomponent processing better with LOGO PD
     self-direction better with LOGO PD

3. Dalton (1989)
   s. fifth and sixth graders
   c. PD of mixed and same genders
   t. learning scientific concepts
   d. one session
   f. no achievement differences
      male/male PD most difficulty in cooperating
      male/male PD quickest time in completing lessons
      male/female PD demonstrated the most positive attitudes

4. Dosset and Hulvershorn (1983)
   s. Air Force students
   c. PD of mixed (high and low) and same abilities
   t. learning electronic principles
   d. a six week course
   f. no differences in achievement scores
      lower ability students responded more quickly in mixed ability grouping

5. Guntermann and Tovar (1987)
   s. fourth graders
   c. PD of mixed and same genders
   t. problem solving with logo
   d. one session
   f. males displayed more solidarity
      males asked more questions
      males most difficulty in cooperating

6. Hooper (1991)
   s. fifth and sixth graders
   c. PD of mixed (high and middle) and same abilities
   t. learning a rule based arithmetic system
   d. one session
   f. highest achievement scores for same PD
      more help generated and received for same PD

7. Hooper and Hanifan (1988)
   s. eighth graders
   c. PD of mixed (high and low) and same abilities
   t. learning a rule based arithmetic system
   d. one session
   f. low ability students helped in the mixed PD

8. Hooper et al. (1989)
   s. undergraduate students
   c. PD of mixed and same abilities
   t. learning a rule based arithmetic system
   d. one session
   f. no differences found

9. Johnson et al. (1986)
   s. eighth graders
   c. cooperative GRP, competitive GRP, & IND
   t. geography gaming task
   d. ten class-periods
   f. Coop GRP had slightly higher final test scores
      Coop GRP needed less help from teachers

10. King (1990)
   s. fourth graders
   c. TD of different question-asking strategies
   t. Logo problem solving
   d. one session
   f. successful groups more task questions
      successful groups more time deciding strategies

11. King (1991)
   s. fifth graders
   c. PDs of different conditions for asking guided questions
   t. Logo problem solving task
   d. one session
   f. guided questioners outperformed other groups
      guided questioners gave more explanations

12. Nastasi and Clements (in press)
   s. third graders
   c. Logo PD versus regular CBT PD
   t. Logo problem solving
   d. several weeks
   f. Logo PD exhibited more work-related behaviors, information-seeking, cognitive-based resolutions

13. Reid et al. (1983)
   s. undergraduates
   c. PD of mixed and same genders and anxiety levels
   t. algebra course
   d. two months
   f. lowest achievement scores for PD mixed on gender and anxiety
      female PD needed the most time to complete the lessons

14. Strommen (1991)
   s. fourth graders
   c. cooperative PD task versus competitive PD task
   t. computer game
   d. one session
   f. cooperative PD did best

15. Underwood et al. (1990)
    s. fifth graders
    c. PD of mixed and same genders
    t. language task
    d. one session
    f PD more efficient for same-sex pairings

16. Yueh and Alessi (1988)
    s. junior high students
    c. PD of mixed (high and middle) and same abilities
    t. algebraic learning task
    d. several sessions
    f. no significant effects

Summary of Survey Studies

Description of these Studies

These studies are annotated in Table 3 by subject populations, methodologies (questionnaire or observational), durations of observations, and main findings. The subject populations varied from preschoolers to high school students with most of these studies dealing with the social behaviors of normal elementary school students or preschoolers. Two of these studies did examine the social behaviors of students with learning disabilities(Lieber & Semmel, 1988; Wizer, Malouf & Grogan, 1987)

Findings

Several salient trends emerge from these data regarding students' social behaviors at computer terminals. Positive social interactions among students did transpire for small group CBT activities. From preschool to high school, students served as "peer teachers" by explaining course materials to other students (e.g, Littlejohn, Ross, & Gump, 1984; Mehan, 1989; Paris & Morris, 1985; Webb, 1984, 1986; Zimmermann, Smith, Barston, & Friend, 1989). Such peer teaching usually occurred without encouragement from the

teacher. Dominant behaviors at computer terminals were only prevalent for the two studies involving learning disabled student (Lieber & Semmel, 1988; Wizer et al., 1987).

Another trend was that students, regardless of age, were more likely to work together on computer activities than on regular classroom activities (e.g., Mehan, 1989; Muller & Perlmutter, 1986; Hawkins et al., 1984; Zimmerman et al., 1989). Muller & Perlmutter found that preschoolers who usually worked on jigsaw puzzles by themselves tended to work with peers on computer activities. Zimmermann et al. noted that high school students preferred to work together on computer assignments than by themselves on other class assignments. These reported social differences may have been an artifact of the computer's novelty in the classroom or its difficulty to operate (Hawkins et al.; Zimmermann et al.).

These survey studies have thus shown that computer work does not necessarily lead to social isolation. Computers provided an opportunity for young children to work together (Muller & Perlmutter, 1986; Littlejohn et al., 1984; Mehan, 1989). Because of limited economic resources, elementary-school teachers have grouped students at computer terminals (Littlejohn et al.; Mehan) Also, high-school students reported that computer work provided them with more of an opportunity to know other students than did reading printed materials (Zimmerman et al.).

Information was also obtained about the effects of different instructional arrangements upon students' social behaviors (e.g., Hativia Swissa, & Lesgold, 1989; Lieber & Semmel, 1988; Wizer,

Malouf & Grogan, 1987). Hativia et al. found that allowing students unlimited response time fostered prosocial interactions at the computer terminals. Also, homogeneous pairings of learning disabled students led to more productive social interactions between partners than did heterogeneous pairings of such students (Lieber & Semmel; Wizer et al).

Table 3: Survey Studies

Key:

s= types of subjects; m= methodology; d=durations of studies; f=main findings

1. White (1998)
   - s teachers from different Department of Defense Dependency Schools
   - m. questionnaire
   - f. majority felt that IND CBT was best
     70% felt that computer use led to cooperation among students

2. Guerreo et al. (1990)
   - s. New York City teachers from grades K-12
   - m. interviews and observations
   - d. one semester
   - f. belief by teachers that small-group CBT enhances students' motivation and self-esteem
     observations confirmed positive social interactions in small group CBT instruction

3. Hativia et al. (1991)
   - s. elementary school students
   - m. questionnaires and observations
   - d. six months
   - f. more competition and individualized work for timed answers
     more cooperation and group work for untimed answers

4. Hawkins et al. (1984)
   - s. elementary school students

m. interviews and observations
d. two cycles of computer use
f. students collaborate more while working on computers
students claimed benefits for individualized work

5. Lieber and Semmel (1988)
s. learning disabled elementary school students
m. observations
d. four weeks
f. heterogeneous dyads dominated by non-handicapped partner
homogeneous dyads not dominated by either partner

6. Lipinski et al. (1989)
s. nursery school children
m. observations
d. four weeks
f. social interactions at computers similar to those found in other areas

7. Littlejohn et al. (1984)
s. elementary school students
m. interviews and observations
d. 79 computer sessions were observed
f. teachers paired students at computers because of economic reasons
positive social interactions at computers

8. Johnson and Ross (1989)
s. different elementary classrooms
m. observations of classroom behaviors
d. a few weeks
f. not clear if students worked by themselves or with others

9. Mehan (1989)
s. four elementary school classrooms
m. observations of classroom behaviors
d. a few weeks
f. teachers paired students at computers
qualitatively different social interactions at terminals

10. Muller and Perlmutter (1986)
s. preschoolers
m. observations of behaviors
d. a few weeks
f. large percentage of computer activity with peers involving positive social interactions
small percentage of non-computer activities with peers

11. Paris and Morris (1985)
    s. preschoolers
    m. observations of social behaviors
    d. two sessions
    f. preschoolers engaged in prosocial behaviors around the computers
       preschoolers were effective peer-teacher

12. Wizer et al. (1987)
    s. teenage learning disabled students
    m. observations of behaviors at the terminals
    d. five sessions with computers
    f. poor interactions among students
       technology made it harder to learn the tasks

13. Webb (1984)
    s. junior high students
    m. observations of behaviors at terminals
    d. five sessions on Logo programming
    f. small group work viable setting for learning computer programing
       relationship between social interactions & achievement different from those previously reported for other media

14. Webb et al. (1986)
    s. 11 to 14 year-olds
    m. observations of problem-solving behaviors at terminals
    d. session on BASIC programming
    f. small group work viable for learning computer programing
       relationship between social interactions & achievement consistent with those reported for other media

15. Zimmermann et al. (1989)
    s. high school students
    m. interviews
    f. students more likely to work together on computer activities than on non-computer activities

Final Comments

In summary, the following salient patterns emerged from this review of small group CBT:

(1) Consistent effects were not found for either small group or individualized use of computers on students' achievement or retention scores.

(2) Small group learning led to a more efficient use of the computers.

(3) Positive social interactions were commonly found during small group CBT activities.

(4) Heterogeneous groupings seemed to be best for students with high and low abilities.

(5) Task demands (e.g., response time to questions) could foster or impede cooperative learning.

These findings have demonstrated the educational value of small group CBT (see points 2 and 3). This instructional strategy can seemingly help educators and trainers to meet the contemporary challenge of using computers in times of dwindling financial resources. It also seems that certain instructional considerations must be taken into account when implementing small group CBT (see points 4 and 5).

Educators should also realize that small group CBT has not been demonstrated to be more instructionally effective than individualized CBT (see point 1). This "non-finding" could reflect ATIs in students' abilities to benefit from small group or individualized CBT. For example, extroverts or learning disabled students might benefit more from small group CBT than individualized CBT, while the reverse might be the case for introverts or highly gifted students. Such possible ATI effects for small group CBT have largely been ignored by the research community. Hence, claims about this instructional strategy's potential for addressing student differences have not been

authenticated.

A dearth of information also exists about the relative value of small group CBI in regards to other forms of small group learning. This review has thus not authenticated the widely held belief that findings regarding small group learning transfer from non-computer situations to computer situations. In fact, this review's findings make one question the veracity of this belief, which has fueled the movement towards small group CBI.

In closing, this review has found much support for the use of small group CBT. However, important issues still remain largely unexplored on this topic. These issues deal with the:

(1) possible ATI in students' preferences for and abilities to use small group and individualized CBT.

and (2) relative value of small group learning for computer and non-computer tasks.

Perhaps answers to these important questions will be discussed in forthcoming meetings of this society.

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